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## EUROPEAN PATENT APPLICATION

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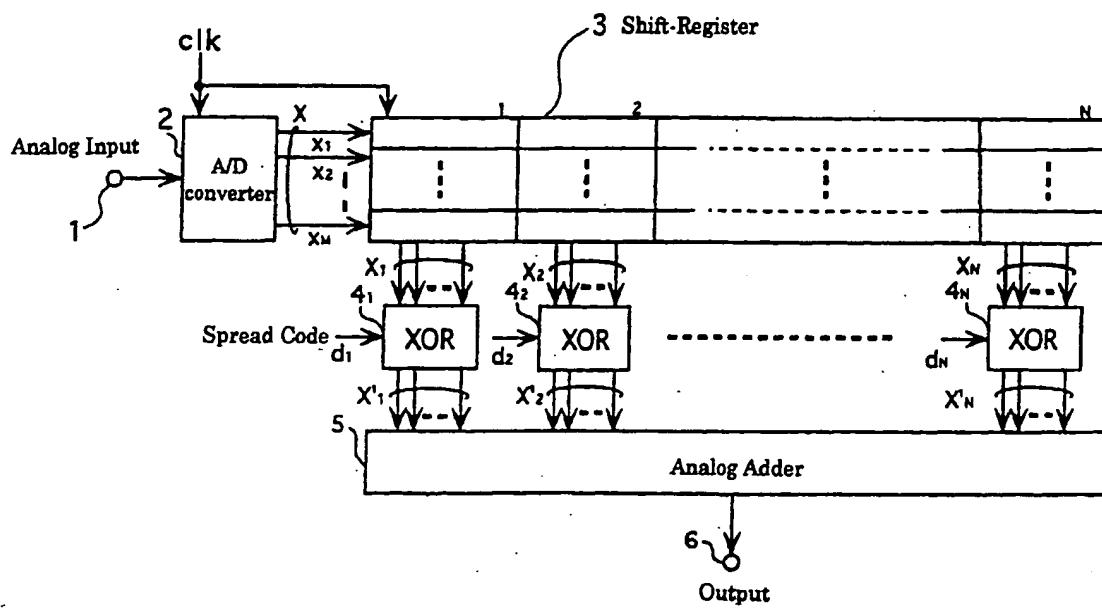
(54) Matched filter and filter circuit

(57) The invention provides according to a first aspect a low electric power consumption matched filter. The signal received at an input terminal is input to a shift-register having stages equal to the spread code length number after conversion into M-bit digital signals in an analog-to-digital converter. The outputs of the shift-register stages are input to EXCLUSIVE-OR circuits set corresponding to each stage, so that EXCLUSIVE-OR is performed between the outputs and corresponding spread code bits  $d_1$  to  $d_N$ . The outputs of the EXCLUSIVE-OR circuits are analogously added in an analog adder and output from an output terminal. According to a second aspect the invention provides a filter circuit using an analog operation circuit to prevent lowering of operation accuracy caused by the residual charge. Input

analog signals successively undergo sampling and holding in each sampling and holding circuit, are multiplied by coefficients stored in a shift register by multiplication circuits, and added in addition circuit. Sample data transmission error storage is prevented by shifting coefficients in the shift register. Sampling and holding circuits and multiplication circuits are formed by analog operation circuits, and each include a switch for canceling the residual charge. The sampling and holding circuits and multiplication circuits normally working are refreshed sequentially by providing circuits for replacing their function. The addition circuit is set double and refreshed in the same way.

EP 0 855 796 A3

Fig. 1





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**SUPPLEMENTARY  
EUROPEAN SEARCH REPORT**

Application Number  
EP 98 10 1319

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cls)
A	US 4 559 606 A (LU NING H ET AL) 17 December 1985 (1985-12-17) * the whole document *	2	H03H17/02
A	US 5 239 496 A (VANCRAEYNES JAN P) 24 August 1993 (1993-08-24) * column 5, line 64 - column 7, line 10 *	3	
X	GIDEON LEVITA: "THE PERFORMANCE OF DIGITAL MATCHED FILTERS FOR MULTILEVEL SIGNALS" IEEE TRANSACTIONS ON COMMUNICATIONS., vol. 31, no. 11, November 1983 (1983-11), XP002121767 IEEE INC. NEW YORK., US ISSN: 0090-6778 * page 1222, column 2, line 48 - page 1223, column 2, line 13; figure 4 *	1	
A	EP 0 609 095 A (SIGNAL PROCESSORS LTD) 3 August 1994 (1994-08-03) * column 13, line 32 - column 14, line 5; figure 8 * * column 15, line 8 - column 16, line 20 * * column 23, line 22 - column 24, line 50; figure 14 *	4	TECHNICAL FIELDS SEARCHED (Int.Cls) H03H
A	WO 92 09990 A (ITALTEL SPA) 11 June 1992 (1992-06-11) * the whole document *	4,5	
The supplementary search report has been based on the last set of claims valid and available at the start of the search.			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>11 June 2002</b>	Examiner <b>Coppieters, C</b>
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

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European Patent  
Office

Application Number

EP 98 10 1319

#### CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

#### LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number  
EP 98 10 1319

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-3

Matched filter

1.1. Claims: 4-8

Filter circuit comprising refreshing means for canceling offset voltage.

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 10 1319

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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11-06-2002

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82